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"On the Periodicity in the Electric *Touch* of Chemical Elements. Preliminary Notice." By JAGADIS CHUNDER BOSE, M.A., D.Sc., Professor of Physical Science, Presidency College, Calcutta. Communicated by LORD RAYLEIGH, F.R.S. Received December 6, 1899,—Read January 25, 1900.

In my previous communication* an account was given of the contact sensitiveness of elementary substances to electric radiation. It was shown that though many substances exhibit a diminution of contact resistance, there are others, of which potassium may be taken as an example, which show an increase of resistance—an increase which, in some cases, lasts during the impact of electric waves, the sensitive element quickly recovering on the cessation of radiation. There are thus produced two opposite effects, which depend on the nature of sensitive substance.

As the normal action of radiation is to produce opposite effects on the two classes of substances, it would be advisable, in order to avoid confusion, to use a simple term to indicate these actions, and to distinguish them from one another, by calling the one positive and the other negative. The sensitiveness is found confined to the outer surfaces in contact, and not extended to the substratum; I have there-

* "On a Self-recovering Coherer, and the Study of Cohering Action of different Metals," 'Roy. Soc. Proc.,' vol. 65.

fore used the term "Electric Touch," in the restricted sense of sensitiveness to electric radiation, the touch being regarded *positive* when there is a diminution of resistance by the action of radiation, and *negative* when radiation produces an increase of resistance.

In continuation of my previous investigation, I have completed a systematic inquiry into the action of nearly all the elements, including the metalloids and non-metals; also of alloys, amalgams, and compounds. Very great difficulty was at first encountered in working with the non-metals, which are extremely bad conductors. The difficulty has, however, been overcome by the successful working of a new method of radiation balance. As a result of these investigations, it is found that the increase of resistance exhibited by elements is far from being a rare phenomenon, nearly half the number of elements exhibiting this effect.

In the exhibition of the phenomenon of contact sensitiveness, various causes give rise to actions which appear at first to be very anomalous. These causes have been isolated and their effects separately studied. Results have thus been obtained which are uniformly consistent.

Experiments have specially been carried out in the following subjects:—

- (1) On the passage of electricity through imperfect contacts.
- (2) The effects of various physical causes on the contact sensitiveness.
- (3) On the difference between mass action and molecular action.
- (4) On the changes produced in the sensitive substance by the action of radiation.
- (5) On the cause of "fatigue."
- (6) On electric reversal.

The study of the above supports the following hypotheses:—

- (a) That the contact sensitiveness depends on the chemical substance.
- (b) That the sensitiveness of an element is a periodic function of its atomic weight.
- (c) That the effect of radiation is to produce a molecular change or allotropic modification of the substance acted on, so that a positive substance becomes less positive, and a negative substance less negative. The change may in certain cases produce actual reversal.
- (d) That the so-called "fatigue" is due to the presence of "radiation products."

A detailed account of these investigations will be communicated at an early date.